

REMARKSClaim Rejections 35 U.S.C. § 112, first paragraph

The Examiner has rejected claims 1 - 7 and 19 - 23 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

Applicant respectfully disagrees with the Examiner. Applicant has amended claim 1 and claim 19 of Applicant's claimed invention. Claims 2 - 7 are dependent on claim 1, as amended. Claims 20 - 23 are dependent on claim 19, as amended.

Applicant wishes to point out to the Examiner that the specification describes that, in one embodiment, the thin film (220) in the multilayer stack (250) has a thin film thickness (221) that is less than 20 % of the critical dimension (CD) of features in the device. See Figure 1. Also, see paragraph [0013] on page 5 of the specification.

Applicant wishes to point out to the Examiner that the specification also describes that, in one embodiment, the deposition and the treatment (of each thin film) are alternated and repeated as many times as needed to obtain a multilayer stack (255) with the desired total multilayer stack thickness (256). See Figure 3F. Also, see paragraph [0030] on page 9 of the specification.

The Applicant further wishes to point out to the Examiner that the specification describes that, in one embodiment, each thin film (205, 305) within the multilayer stack (255) has the same thickness. See Figure 3F. Also, see paragraph [0031] on page 9 of the specification.

In view of the foregoing, Applicant respectfully requests the Examiner to withdraw the rejections to claims 1 - 7 and 19 - 23 under 35 U.S.C. §112, first paragraph, since the claims contain subject matter which was described in the specification in such a way as to reasonably convey to one skilled in the relevant art

that the inventor, at the time the application was filed, had possession of the claimed invention.

**Claim Rejections 35 U.S.C. § 102 (b)**

**Claims 1 - 7**

The Examiner has rejected claims 1 - 7, insofar as in compliance with 35 U.S.C. §112, first paragraph, under 35 U.S.C. §102 (b) as being anticipated by Gnade et al. (US 5,561,318, of record).

Applicant respectfully disagrees with the Examiner. Applicant has amended claim 1 of Applicant's claimed invention. Support is provided in paragraph [0013] on page 5 and in paragraph [0031] on page 9 of the specification.

Claim 1, as amended, of Applicant's claimed invention claims a device including a multilayer stack (250) of thin films (210, 220, 230), the thin films including a low-dielectric constant material, the thin films having pores (115), wherein each thin film within the multilayer stack has a thickness (221) of less than 20.0% of critical dimension (CD) of features in the device. See Figure 1.

One of ordinary skill in the art would understand that CD does NOT refer to a thickness of a film as stated by the Examiner. Instead, one of ordinary skill in the art of making semiconductors at the time the invention was made would know that a critical dimension, abbreviated as CD, is a term of art that refers to a minimum achievable size of a feature in a device, and that the CD of the feature refers to a distance, such as a width, between opposing edges of the feature.

The reference of Gnade et al. cited by the Examiner teaches a structure having a spun-on porous dielectric bottom sublayer (28), a spun-on porous dielectric top

sublayer (29), and a chemical vapor deposited non-porous dielectric layer (30). See Figure 1D. Also, see Col. 5, lines 8-9 and lines 17-18.

However, Gnade et al. fails to teach that each dielectric layer in the structure has pores and has a thickness of less than 20.0% of critical dimension (CD) of features in the device. Thus, the reference of Gnade et al. cited by the Examiner does not teach each and every element of claim 1, as amended, of Applicant's claimed invention and so Gnade et al. does not anticipate claim 1, as amended, of Applicant's claimed invention.

Claims 2-7 are dependent on claim 1, as amended, of Applicant's claimed invention. Thus, the reference of Gnade et al. cited by the Examiner also does not teach each and every element of claims 2 - 7 of Applicant's claimed invention and so Gnade et al. also does not anticipate claims 2 - 7 of Applicant's claimed invention.

In view of the foregoing, Applicant respectfully requests the Examiner to withdraw the rejections to claims 1 - 7 of Applicant's claimed invention under 35 U.S.C. §102 (b).

#### Claim Rejections 35 U.S.C. § 102 (b)

#### Claims 1 - 7 and 19 - 23

The Examiner has rejected claims 1 - 7 and 19 - 23, insofar as in compliance with 35 U.S.C. §112, first paragraph, under 35 U.S.C. §102 (b) as being anticipated by Havemann et al. (US 5,488,015, of record).

Claims 1 - 7

Applicant respectfully disagrees with the Examiner. Applicant has amended claim 1 of Applicant's claimed invention. Support is provided in paragraph [0013] on page 5 and in paragraph 31 on page 9 of the specification.

Claim 1, as amended, of Applicant's claimed invention claims a device including a multilayer stack (250) of thin films (210, 220, 230), the thin films including a low-dielectric constant material, the thin films having pores (115), wherein each thin film within the multilayer stack has a thickness (221) of less than 20.0% of critical dimension (CD) of features in the device. See Figure 1.

One of ordinary skill in the art would understand that CD does NOT refer to a thickness of a film as stated by the Examiner. Instead, one of ordinary skill in the art of making semiconductors at the time the invention was made would know that a critical dimension, abbreviated as CD, is a term of art that refers to a minimum achievable size of a feature in a device, and that the CD of the feature refers to a distance, such as a width, between opposing edges of the feature.

The Havemann et al. reference cited by the Examiner teaches a hybrid porous/non-porous dielectric structure. See Col. 2, lines 32-34. In one case, Havemann et al. teaches capping a porous dielectric layer (28) with a non-porous dielectric layer (30). See Figure 3C. Also, see Col. 6, lines 64-65. In another case, Havemann et al. teaches covering a porous dielectric layer (28) with a conformal sublayer (56) and then capping with a non-porous dielectric layer (30). See Figure 6E. Also, see Col. 8, lines 6-8 and lines 14-15.

However, Havemann et al. fails to teach that each dielectric layer in the structure has pores and has a thickness of less than 20.0% of critical dimension (CD) of features in the device. See Figure 3C. Also, see Figure 6E. Thus, the reference of Havemann et al. cited by the Examiner does not teach each and every element of

claim 1, as amended, of Applicant's claimed invention and so Havemann et al. does not anticipate claim 1, as amended, of Applicant's claimed invention.

Claims 2 - 7 are dependent on claim 1, as amended, of Applicant's claimed invention. Thus, the reference of Havemann et al. cited by the Examiner also does not teach each and every element of claims 2 - 7 of Applicant's claimed invention and so Havemann et al. also does not anticipate claims 2 - 7 of Applicant's claimed invention.

In view of the foregoing, Applicant respectfully requests the Examiner to withdraw the rejections to claims 1 - 7 of Applicant's claimed invention under 35 U.S.C. §102 (b).

#### Claims 19 - 23

Applicant respectfully disagrees with the Examiner. Applicant has amended claim 19 of Applicant's claimed invention. Support is provided in paragraph [0013] on page 5 and in paragraph [0031] on page 9 of the specification.

Claim 19, as amended, of Applicant's claimed invention claims a multilevel interconnect system for a device including: an underlying metal level (100); a multilayer stack (250) located over the underlying metal level, the multilayer stack including: thin films (210, 220, 230), the thin films having a low dielectric constant, the thin films having pores (115), wherein each thin film has a thickness (221) of less than 20.0% of critical dimension (CD) of features in the device; and an overlying metal level (300) located over the multilayer stack. See Figure 1.

One of ordinary skill in the art would understand that CD does NOT refer to a thickness of a film as stated by the Examiner. Instead, one of ordinary skill in the art of making semiconductors at the time the invention was made would know that a critical dimension, abbreviated as CD, is a term of art that refers to a minimum

achievable size of a feature in a device, and that the CD of the feature refers to a distance, such as a width, between opposing edges of the feature.

The Havemann et al. reference cited by the Examiner teaches a hybrid porous/non-porous dielectric structure. See Col. 2, lines 32-34. In one case, Havemann et al. teaches capping a porous dielectric layer (28) with a non-porous dielectric layer (30). See Figure 3C. Also, see Col. 6, lines 64-65. In another case, Havemann et al. teaches covering a porous dielectric layer (28) with a conformal sublayer (56) and then capping with a non-porous dielectric layer (30). See Figure 6E. Also, see Col. 8, lines 6-8 and lines 14-15.

However, Havemann et al. fails to teach that each dielectric layer in the structure has pores and has a thickness of less than 20.0% of critical dimension (CD) of features in the device. See Figure 3C. Also, see Figure 6E. Thus, the reference of Havemann et al. cited by the Examiner does not teach each and every element of claim 19, as amended, of Applicant's claimed invention and so Havemann et al. does not anticipate claim 19, as amended, of Applicant's claimed invention.

Claims 20 - 23 are dependent on claim 19, as amended, of Applicant's claimed invention. Thus, the reference of Havemann et al. cited by the Examiner also does not teach each and every element of claims 20 - 23 of Applicant's claimed invention and so Havemann et al. also does not anticipate claims 20 - 23 of Applicant's claimed invention.

In view of the foregoing, Applicant respectfully requests the Examiner to withdraw the rejections to claims 19 - 23 of Applicant's claimed invention under 35 U.S.C. §102 (b).

**Conclusion**

Applicant has amended claims 1 and 19. Applicant has further added new claims 24 - 26.

Applicant believes that all claims pending, including amended claims 1 and 19 and new claims 24 - 26, of Applicant's claimed invention, are now in condition for allowance so such action is earnestly solicited at the earliest possible date.